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ABSTRACT

Research into fluctuations in anxiety before and after a threatening event suggests that anxiety may decrease as the anticipated threat draws near. To investigate the experience of actual test anxiety (TA) compared to its anticipation and recollection, 502 college students completed 10-item alternate forms (A and B) of the State Trait Anxiety Inventory (STAI), developed from the 20-item form X. Form A was administered one day before an examination, under either "imagine" instructions or standard ("now") instructions. Form B was administered either: (1) before the examination, with standard instructions; (2) one day after the examination but before examination feedback, with recall instructions; or (3) after feedback, with recall instructions. An analysis of the results showed that imagined TA was higher than actual TA. Subjects receiving imagine instructions at first testing later demonstrated higher TA than those receiving now instructions at the first testing, reflecting lower performance associated with higher TA. Anticipated TA was higher than actual TA. No significant effect of feedback on the recollection of TA was found. Females were higher in recalled TA than were males. These findings offer further support for the validity of the STAI. (BL)

The anticipation, experience, and recollection of test anxiety.

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Abstract

The experience of test anxiety (TA) was compared with its anticipation and recollection using the state anxiety scale of the State-Trait Anxiety Inventory. Anticipated TA was higher than actual TA. There was no significant difference between recalled and actual TA. Examination feedback did not affect the recollection of TA.

The Anticipation, Experience, and Recollection of Test Anxiety

Fluctuations in anxiety before and after a threatening event have been studied by many investigators, most notably, Epstein and Fenz (1965), Grinker and Spiegel (1945), and Mechanic (1962). Contrary to popular expectations, some of their evidence seems to suggest that under certain conditions, anxiety may even decrease as the anticipated threat draws near.

Unlike the previously-mentioned research concerned with fluctuations in anxiety, the focus of the current research is one point in time: the period immediately before a threatening event (a college course examination). The anxiety change of interest is the fluctuation in imagination or recollection of anxiety with reference to the point in time immediately preceding an examination.

Two forms of anxiety, state and trait, have been distinguished by Cattell and Scheier (1961), Spielberger, Gorsuch, and Lushene (1970), and, most recently, Spielberger (1983). State anxiety is defined as a transitory affective condition that has cognitive and physiological components, while trait anxiety is viewed as a relatively stable personality characteristic that indicates a tendency to respond to ego-threatening situations with elevations in state anxiety (Spielberger et al., 1970).

The State-Trait Anxiety Inventory (STAI) consists of separate state anxiety and trait anxiety scales (Spielberger et al., 1970). According to standard state anxiety scale instructions, subjects indicate how they feel "right now;" according to trait anxiety scale instructions, subjects indicate how they "generally feel." In addition to measuring anxiety being experienced, the STAI state anxiety scale may be used to evaluate how someone felt at a particular time in the recent past or how someone anticipates he or she will feel in a situation likely to be encountered in the future (Spielberger, 1983). This can be accomplished using modified instructions asking that participants focus on a particular situation or time period and respond accordingly. For example, modified instructions were employed by Lamb (1973), who asked subjects to respond to the scale by recalling how they felt during a speech they had just completed.

Within this research, test anxiety (TA) is conceptualized as state anxiety under examination-stress conditions (cf. Carlson & DeVito, 1983; DeVito & Kubis, 1983a). When TA is conceptualized as state anxiety under examination stress conditions, (a) anxiety may be measured with reference to a specific point in time-- past, present, or future--by modifying the instructions as mentioned previously and (b) anxiety changes are probably better assessed because state anxiety is more likely to fluctuate than is trait anxiety.

The study was undertaken to compare actual TA, imagined TA, and recalled TA. The effect of feedback (that is, knowledge of examination performance) on recalled TA was also examined. In addition, imagined TA was compared with state anxiety under normal conditions.

Methodology

Instruments

Alternate, equivalent forms of the state anxiety scale (DeVito & Kubis, 1983b) of the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) were administered at each of the two sessions. The alternate forms A and B, each 10 items in length, were developed from the 20-item form X. The criteria used in the development of the equivalent, alternate forms were: (a) number and pattern of directly and reversely scored items; (b) content of items; (c) average of the item mean scores; and (d) means of the item-remainder correlation coefficients. The item statistics of criteria (c) and (d) were considered separately for each sex in the construction of the alternate forms.

Procedure

The procedure is schematized in Table 1. At least a day before an introductory psychology examination, the participants were administered form A of the state anxiety scale, with either imagine instructions (to measure imagined TA) or standard (now) instructions (to measure state anxiety under normal conditions). Imagine instructions directed subjects to respond according to how

they believed they would feel immediately before the examination.

All subjects were retested using form B of the state anxiety scale either: (a) immediately before the examination (Group E) with standard (now) instructions (to measure actual TA); (b) at least a day after the examination, but before accurate examination feedback (Group B), with recall instructions (to measure recalled TA before feedback); or (c) at least a day after feedback (Group A) with recall instructions (to measure recalled TA after feedback). Recall instructions directed subjects to respond according to how they felt immediately before the examination.

Participants

Participants were City University of New York undergraduates enrolled in 21 different classes in introductory psychology. All testing was done in non-interactive class groups. There were 543 subjects present for both testing sessions. Those who had answered fewer than eight state anxiety scale items or were missing other important information were excluded (for example, those who did not take the course examination or did not give their name). There were 502 subjects remaining.

Results

Hypotheses were tested within analysis of variance designs which included, as appropriate, the factors: first or second testing; initial instructions (imagine or now); time of second testing (at the exam, before feedback, after feedback); sex of subject; and performance level. Performance was stratified into

high, medium, and low levels (or thirds of class) depending upon subject's examination score relative to the other participants in his or her class. While analyses included all existing factors, the means in Table 1 summarizing the results are collapsed over sex and performance. The cells referred to below are also given in Table 1. Table 2 is extensive in that it has means and standard deviations for 72 conditions (2 sexes, 3 performance levels, 2 testings, 2 types of initial instructions, and 3 times of second testing). It is too detailed for consideration at this time.

Imagined TA was compared with actual TA in two ways. Cells 3 and 5 were compared with cell 8 using an ANOVA for independent groups. The factors were anticipation (imagined TA or actual TA), sex, and performance level. The results of the ANOVA are presented in Table 3. As can be seen from the significant main effect, imagined TA was significantly higher than actual TA. To compare cells 1 and 7, a 3-way ANOVA with repeated measures on the anticipation factor, was performed. There were no significant effects, as can be seen in Table 4, and the main effect for anticipation was not significant ($p=.08$).

Actual TA was compared with recalled TA within an ANOVA in Table 5. The state anxiety scale mean of cells 7 and 8 (actual TA) was not significantly different from the mean of cells 9 and 10 (recalled TA). The significant instructions effect in Table 5 indicates that those receiving <u>imagine</u> instructions at first

testing later demonstrated higher TA (both actual and recalled) than those receiving now instructions at the time of first testing. The significant performance effect reflects lower performance associated with higher TA.

The effect of feedback on the recollection of TA was studied by comparing the state anxiety mean of cells 9 and 10 with that of cells 11 and 12 (Table 6). No significant difference was found in TA before and after feedback. Female participants were higher in recalled test anxiety than males. There were also two significant higher order interactions: (a) Sex x Instructions x Performance and (b) Sex x Feedback x Instructions x Performance.

The design also permitted comparison of state anxiety under normal conditions with state anxiety under examination stress conditions. The mean of cells 4 and 6 was significantly higher than that of cell 7 as is summarized in Table 7. Similarly, in the analysis in Table 8, the mean of cell 8 was significantly higher than that of cell 2. Both of these analyses indicate that state anxiety is higher under examination stress conditions.

Implications and Conclusions

That imagined TA was higher than actual TA suggests that the higher anxiety felt days before a test may influence or exaggerate the imagination of the anxiety which will be experienced at the time of the test. In other words, the anticipation of the anxiety-producing event is probably worse than the anxiety felt at the event itself. This information could be useful to the

teacher, counselor, or clinician in working with a test-anxious person. Another explanation for this result is that the anxiety is denied immediately before the examination in order to maximize or enhance performance.

Failure to find significant differences between recalled and actual TA is one line of evidence suggesting that recollection of an anxiety producing event is fairly accurate--that is, neither exaggerated or minimized. Even accurate examination-performance feedback does not cause a mean change in perception (recollection) of anxiety experienced at the time of the exam. The finding that prior exposure to imagine instructions (as opposed to now instructions) resulted in higher TA (experienced and recalled), suggests that subjects were somehow sensitized to the situation. An implication for the practitioner wishing to reduce a client's anxiety is that it may be better <u>not</u> to draw unnecessary attention to the anxiety-producing situation and the correlates of an anxiety producing situation as is done by the imagine instructions and the state anxiety scale items. Relating this finding to another result, the marginally significant ($p=.08$) mean difference between imagined and actual TA in the repeated measures analysis (Table 4) might have been more substantial were it not for the prior exposure to imagine instructions which may have resulted in elevated reports of anxiety at the time of the examination.

Sex of subject was included as an independent variable in all the analyses, but in only one case was there a significant sex difference with females reporting higher recalled TA. Contradictory results seem to be common in the literature, but when a significant sex difference is found, it is usually reported that the females have higher anxiety. Such findings are usually explained in terms of social desirability, greater expressiveness of women, or greater openness and honesty of women.

The results of this research also have implications for the state anxiety scales of the STAI. This research adds to the already abundant validity evidence for the state anxiety scale as an instrument to measure elevations in state anxiety. In this research, the anxiety under normal conditions was significantly lower than that under examination-stress conditions. Higher state anxiety scale scores under examination stress conditions indicate that the examination was, indeed, ego-threatening.

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Table 1

Schematization of Experimental Design According to Instructions Received at Each Testing and Time of Second Testing and Mean State Anxiety Scale Scores Under Each Condition

		First Testing	Second Testing		
Group	N	at least one day before exam	Immediately before exam	After exam, before feedback	After exam, after feedback
IE	95	(1) imagine 24.8	(7) now 23.6		
NE	88	(2) now 19.0	(8) now 22.1		
IB	98	(3) imagine 25.6		(9) recall 24.7	
NB	88	(4) now 19.7		(10) recall 23.4	
IA	57	(5) imagine 26.1			(11) recall 24.5
NA	76	(6) now 19.7			(12) recall 24.0

Note. Numbers in parenthesis are cells referred to in the text. "Now" instructions are standard state anxiety scale instructions for the State-Trait Anxiety Inventory. Numbers with decimal points are the state anxiety scale means collapsed over sex and performance level.

Table 2

State Anxiety Means and Standard Deviations For Each Sex, Subgroup, Performance Level, and Testing Session

Group	Performance Level	Sex	N	Session 1		Session 2	
				M	SD	M	SD
IE	L	M	10	23.1	5.0	24.6	4.5
		F	21	27.0	4.8	25.0	6.8
	M	M	16	23.6	5.2	23.6	6.7
		F	18	25.1	5.0	24.2	6.2
	H	M	12	22.9	3.9	20.1	6.1
		F	18	25.0	6.2	23.2	5.7
NE	L	M	9	21.2	4.6	22.7	6.3
		F	20	17.6	3.9	23.1	5.4
	M	M	9	21.1	6.5	21.3	5.8
		F	20	20.1	5.2	22.3	6.4
	H	M	16	18.6	4.3	22.4	5.4
		F	14	17.4	5.0	20.2	2.9
IB	L	M	14	23.6	5.6	24.1	6.2
		F	22	25.5	5.1	25.1	6.7
	M	M	6	26.3	6.6	27.2	7.8
		F	26	26.5	4.4	24.5	4.7
	H	M	6	24.7	6.8	22.5	4.6
		F	24	26.2	6.0	24.8	5.0
NB	L	M	8	21.5	5.0	21.1	6.8
		F	20	19.1	4.2	25.1	4.6
	M	M	7	20.0	4.8	23.1	4.4
		F	23	21.0	4.5	25.1	6.2
	H	M	10	17.9	5.6	19.8	4.8
		F	20	19.1	4.6	22.4	5.8
IA	L	M	7	25.7	4.3	24.9	4.6
		F	9	25.4	4.3	22.7	5.2
	M	M	7	25.6	7.1	22.0	9.5
		F	7	31.1	3.4	28.0	6.4
	H	M	15	24.1	6.0	22.5	5.2
		F	12	26.8	7.0	27.8	8.2
NA	L	M	16	18.9	4.6	19.6	4.0
		F	12	19.0	4.1	26.9	6.7
	M	M	9	17.6	4.4	25.0	5.2
		F	18	20.8	5.6	25.2	5.1
	H	M	9	21.0	4.1	24.0	6.9
		F	12	20.4	6.1	24.3	6.5

Table 3

ANOVA with Imagined vs. Actual TA, Sex, and Performance Level as Main Effects (Cells 3 and 5 vs. Cell 8)

Source	df	MS	F
Sex(S)	1	22.57	0.75
Anticipation (imagine vs. actual TA) (A)	1	654.80	21.65*
Performance level (P)	2	15.26	0.50
SA	1	44.80	1.48
SP	2	7.50	0.25
AP	2	36.48	1.21
SAP	2	20.15	0.67
Error	231	30.25	

*$p < .0001$.

Table 4

ANOVA with Imagined vs. Actual TA, Sex,

and Performance Level as Main Effects

(Cells 1 vs. 7)

Source	df	MS	F
Between			
Performance level (P)	2	65.13	1.31
Sex (S)	1	166.86	3.36
PS	2	9.53	0.19
Error	89	49.70	
Within			
Anticipation (imagined vs. actual TA) (A)	1	46.16	3.09
AP	2	18.97	1.27
AS	1	14.66	0.98
APS	2	17.74	1.19
Error	89	14.95	

Table 5

ANOVA With Recalled vs. Actual TA, Sex, and Performance Level as Main Effects (Cells 7 and 8 vs. Cells 9 and 10)

Source	df	MS	F
Sex(S)	1	80.17	2.43
Recalled vs. actual TA (R)	1	78.36	2.37
Instructions, first testing (I)	1	211.76	6.41*
Performance Level (P)	2	130.23	3.94*
SR	1	17.81	0.54
SI	1	4.82	0.15
RI	1	4.78	0.14
SP	2	12.34	0.37
RP	2	29.16	0.88
IP	2	1.26	0.04
SRI	1	86.80	2.63
SRP	2	19.72	0.60
SIP	2	44.42	1.34
RIP	2	14.86	0.45
SRIP	2	2.80	0.08
Error	345	33.02	

*$p < .05$.

Table 6

ANOVA Evaluating Effects of Feedback, Sex, Performance Level, and Instructions at First Testing on Recollection of Test Anxiety (Cells 9 and 10 vs. Cells 11 and 12)

Source	df	MS	F
Sex (S)	1	301.32	9.06**
Feedback (Before or After) (F)	1	28.18	0.85
Instructions,first testing (I)	1	92.76	2.79
Performance level (P)	2	54.79	1.65
SF	1	27.17	0.82
SI	1	18.71	0.56
FI	1	33.65	1.01
SP	2	9.54	0.29
FP	2	44.94	1.35
IP	2	5.99	0.18
SFI	1	39.54	1.19
SFP	2	17.15	0.52
SIP	2	118.95	3.57*
FIP	2	0.83	0.02
SFIP	2	101.61	3.05*
Error	295	33.28	

*$p<.05$. **$p<.01$.

Table 7

ANOVA with Effect of Exam Stress, Sex,

and Performance Level on State Anxiety

(Cells 4 and 6 vs. 7)

Source	df	MS	F
Exam-Stress (E)	1	45.37	29.24**
Sex (S)	1	2.85	1.84
Performance Level (P)	2	2.74	1.77
ES	1	.45	.29
EP	2	2.65	1.71
SP	2	.95	.61
ESP	2	1.31	.84
Error	247	1.55	

**$p<.0001$.

Table 8

ANOVA for Effects of Examination Stress Performance Level and Sex on State Anxiety (Cell 2 vs. Cell 8)

Source	df	MS	F
Between			
Performance Level (P)	2	42.78	1.29
Sex (S)	1	50.30	1.51
PS	2	10.94	0.33
Error	82	33.28	
Within			
Exam-Stress vs. normal (E)	1	283.64	14.23*
EP	2	20.70	1.04
ES	1	28.82	1.45
EPS	2	22.13	1.11
Error	82	19.94	